



# QUALITY PAPER

## Implementation of quality management system based on ISO9001:2008 and its effects on customer satisfaction case study

Implementation  
of quality  
management  
system

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Received 12 May 2013  
Accepted 28 August 2013

### Kitchen worktops factory

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#### Abstract

**Purpose** – The purpose of this paper is to discuss the effect of the ISO 9001 quality management system on customer satisfaction and show an application of an analytic hierarchy process (AHP)-based method for measuring the customer satisfaction index (CSI). This will be useful to anyone who wants to have an ISO 9001 quality management system in his or her organization.

**Design/methodology/approach** – This paper describes an ISO 9001 quality management implementation process based on ISO 9001 requirements, and uses the AHP method for weighting effective criteria on customer satisfaction. All data were obtained via questionnaires and assessed with EXPERT CHOICE 11 software.

**Findings** – According to the results of the weighting, the factors influencing the satisfaction of a kitchen worktops customer, price and sales terms of this product has a significant impact on customer satisfaction and, in competitive conditions, this criterion has a determining role in the creation of utility for customers. ISO 9001 quality management system has been able to increase the CSI within an 11-month period of study.

**Originality/value** – This paper is the first to use the AHP method with a new approach in a case study, offering a complete, comprehensive method for assessing customer implications.

**Keywords** Customer satisfaction, AHP, ISO 9001, CSI, Kitchen worktops

**Paper type** Case study

#### Introduction

In a changing world, the importance of quality systems (QS) for organizational excellence has been felt more and more, because it ensures a consistent and desired product quality (Sarkar, 1998). Since the introduction of the ISO 9000 series in 1987, it has become a world-wide quality management norm for organizations, regardless of their size and what they produce (Tsim *et al.*, 2002). Many studies reveal that effective implementation of ISO 9000 can benefit organizations through the improvement of management control (Carlsson and Carlsson, 1996; Lee, 1998), efficiency (Ebrahimpour *et al.*, 1997), productivity (Huang *et al.*, 1999; Terziowski *et al.*, 2003) and customer services (Buttle, 1997; Yeung *et al.*, 2003). Given the intensification of the competitive environment in global and national trade – with the aim of attracting new customers and retaining the existing customers – this study has tried to examine the effects of

The authors highly appreciate the management and staff of the company in the case study, who provided information and facilities to conduct this research.



quality management system implementation, based on the requirements of ISO 9001, on customer satisfaction using an appropriate method and with a neutral attitude toward the research subject.

ISO 9000:2000 standards place great emphasis on the measurement and monitoring of customer satisfaction from the system performance. Recent study results (Han *et al.*, 2007) indicate that, although ISO 9000 does not have a direct positive relationship with customer satisfaction, it can lead to improvements in quality and reductions in cost, which in turn help to achieve customer satisfaction. On the same topic, Lundmark and Westelius (2006) mention that process orientation and customer focus are the most frequently observed benefits from the implementation of ISO 9001:2000 (Gotzamani, 2010).

The main advantage of ISO 9001 implementation in Gotzamani's (2010) surveys is increased management participation in quality-related activities. Quality management systems help an organizations in important ways, such as the reduction of defective products, improvement of internal relations, increase in customer satisfaction, increase of market share, creation of opportunities to influence new markets and the opportunity to become world class. In addition, the implementation of a quality management system will bring further advantages such as a reduction in the cost of quality and errors, an increase in product quality and reduction of waste, a reduction in broken promises in the delivery, an improvement of production, advertising potential and returning costs (Aggelogiannopoulos *et al.*, 2007). Standard implementation will stabilize the expected quality for products and services. The reduction of customer complaints and inconsistent products and an increase in customer satisfaction are other effects of the standard implementation (Rusjan and Alice, 2010; Landrigan, 1999) in a study about wood products and the factors influencing customer satisfaction for the furniture purchaser in an internet shopping mall, product diversity of service quality, tangibles, responsiveness, interaction, stability and customer satisfaction was found to be significant influencing factors on customer loyalty in the internet shopping mall (Jeong and Lee, 2010).

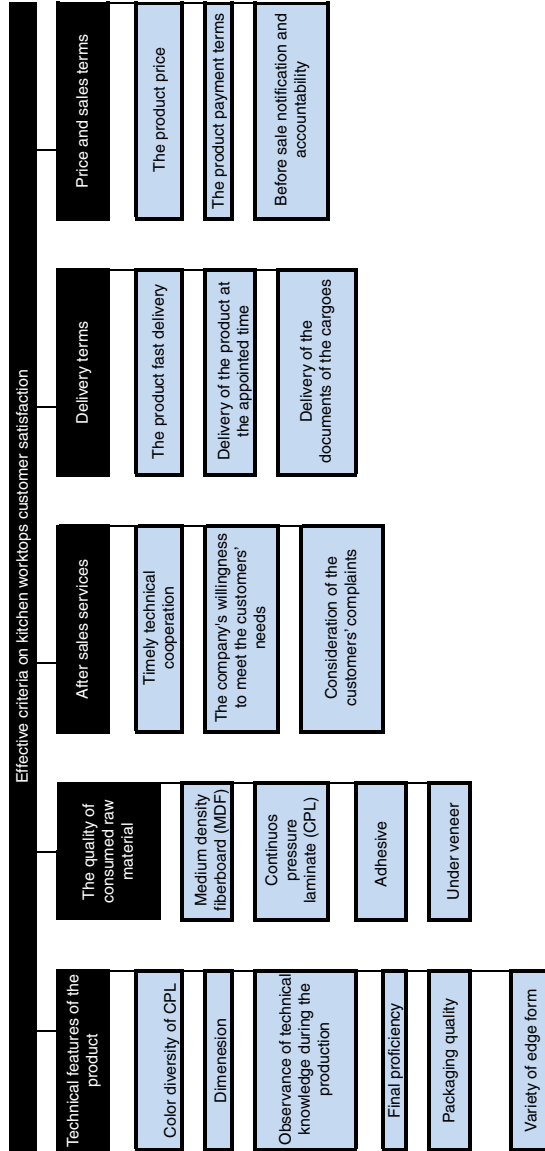
### Methodology

In order to conduct research and to examine the effects of implementation of ISO 9001 on customer satisfaction, various measures have been taken as follows.

#### 1. Identification of the criteria affecting customer satisfaction with the studied product (kitchen worktops)

After library studies, questioning and interviewing the experts, manufacturers and different manufacturing companies, 19 criteria affecting kitchen worktops customer satisfaction were identified. In order to weight the affective criteria through analytic hierarchy process (AHP), these criteria were organized in the format of a hierarchical tree (Figure 1). The affective criteria were divided into five main groups as follows. The descriptions relating to the criteria corresponding to each group are shown in Table I:

- price and sales terms;
- after sales services;
- product delivery terms;
- quality of the applied raw materials; and
- technical specifications of the product.



**Figure 1.**  
Hierarchical tree

**Table I.**  
Description of the 19 sub-criteria affecting kitchen worktops customer satisfaction

Sub-criteria	Descriptions
The product price	This is the amount paid by the customer to receive goods and their associated services
The product payment terms	In common transactions in the market, manufacturers determine various conditions for obtaining the product price according to the product type. This includes payments in cash and in installments
Before sale notification and accountability	The customer's research the technical conditions of the product or sales before the purchase and the notification method will contribute to the customer satisfaction
The company's willingness to meet the customer's needs	Regarding this specific product (kitchen worktops), sometimes customers have certain expectations such as: the use of a certain type of raw materials or delivery in less time, etc. These are highly effective in customer satisfaction
The product's quick delivery	Due to the one-off production of this product in most companies, there is an interval between the order and the delivery. This criterion means to deliver at the appointed time and location and based on the agreed conditions
Delivery of the documents of the cargoes	Sending the list of products with full details (size, color, coating, model, etc.) along with the cargo sent to the customers as well as the instructions on transportation, maintenance and usage
Timely technical cooperation	Responding to the customer's questions regarding the use of the product, removal of the probable problems or notifications about similar or substitute products
Diversity of the product edge form	Post-formed kitchen worktops are highly varied in terms of initial form, which respond to the different tastes of the customers
Color diversity of coating	Kitchen worktops are covered with CPL coating which has various colors (design of wood and stone, etc.)
Observance of technical knowledge during the production	Using new technology and techniques during the production process, including adding the dropper's groove, preventing twisting of the product and not using nails to attach MDF pieces
Packaging quality	Packaging type and utilizing the customer's viewpoints and requirements with regard to this
The quality of the used MDF	The main substance used in construction of this product is MDF, the quality of which is important to the efficiency and durability of the product
The quality of CPL	Kitchen worktop surfaces are exposed to striking, chemicals, heat, friction, UV radiation, etc. the resistance and durability of the product is therefore dependent on the coating quality
The quality of the underlying veneer Dimensions	The surfaces below these worktops are covered with waterproof paper or CBL coating Width, thickness, length and detailed observance of these dimensions in the final product according to the customer's order
The quality of adhesion	The criterion of proper adhesion of the coating to the MDF on the surface and edges is also an effective factor in the level of kitchen worktops customer satisfaction
The quality of the product's efficiency by the customer (final proficiency)	Most of the criteria affecting kitchen worktops customer satisfaction are related to after installation, such as durability of the waterproof strip of the dropper, not losing the edges of the coating, or not wrapping the worktops due to conditions of heat and moisture at the installation location
Consideration of the customer's complaints	Consideration of the customer's complaints as soon as possible and appropriate accountability

## 2. Using AHP for weighting criteria

One of the most efficient weighting and decision-making methods is the AHP, which was first introduced in 1980 by Thomas L Saaty (Asgharpour, 1998). This method is based on paired comparison and allows managers to measure and compare various options. This process is one of the most comprehensive systems designed to consider quantitative and qualitative criteria in a problem, because it formulates the problem hierarchically. This technique facilitates decision making through organizing emotions, concepts, estimates and judgments. This analysis process will be implemented through Expert Choice software.

In order to weight each of the criteria and sub-criteria, a questionnaire was developed for their paired comparisons. This questionnaire was completed by 15 experts in the industry and major sellers and consumers of this product. The specifications of respondents are given in Table II.

## 3. Implementation of quality management based on ISO 9001

This study was conducted in a wood products company located in Qom province, which is one of the main manufacturers of kitchen worktops in Iran. This company has 65 employees and the research was conducted during the period January-November 2011. The company's senior manager implemented ISO 9001 to meet their customers' needs and improve the product quality levels. All measures for the ISO 9001 implementation were taken within three months, from January-March 2011.

## 4. Monitoring and measurement of customer satisfaction

In this study, customer satisfaction was measured from the beginning of the period in order to understand the effects of the ISO 9001 implementation on kitchen worktops' customer satisfaction. Considering the wide range of customers with different characteristics and their geographical distribution across Iran, simple random sampling was used to select customers. For greater stabilization of the survey results, 30 customers were constantly and monthly investigated. The selected customers are old customers who have made regular and monthly purchases from the company, and these customers are regularly distributed across Iran. These 30 clients had at least five years' cooperation with the factory and purchased from the factory at least once a month. The completed questionnaires were received via fax. Also, in some cases, the questionnaires were completed through a phone call by the company's sales department personnel.

	Education level	Work experience (years)	Field of work
1	Bachelor degree	4	Production management
2	Bachelor degree	10	Factory management
3	Master degree	3	Wood industry quality control
5	Bachelor degree	12	Wood industry management
6	Associate degree	8	Wood products seller
7	Diploma	25	Kitchen cabinet manufacturer
8	Diploma	20	Kitchen cabinet manufacturer
9	Diploma	15	Wood products seller
10	Associate degree	8	Wood products seller
11	Diploma	10	Kitchen cabinet manufacturer
12	-	5	Seller and distributor of kitchen worktops
13	Diploma	10	Seller and distributor of kitchen worktops
14	Diploma	15	Seller and distributor of kitchen worktops
15	Diploma	12	Kitchen cabinet manufacturer

**Table II.**  
Specifications of the  
respondents to paired  
comparison questionnaire

**How to conduct surveys***1. Questionnaire design*

In designing the questionnaire, all sub-criteria affecting kitchen worktops' customer satisfaction (previously identified), were presented. A Likert scale was used to convert the customers' opinion into a numerical scale. This scale is very common in theoretical investigations and makes it very easy to complete the questionnaire. In designing the questionnaire, five numbers: 0, 1, 3, 5 and 9 were used, which represent, respectively, the phrases – very good – good – moderate – poor and very bad (Zaribaf and Roushani Barab, 2008). This scale is one of the most appropriate scales to measure customer satisfaction, because it increases the power of analysis and makes it easier to transmit the research and survey message.

*2. Quantification of the satisfaction level with the criteria presented by customers*

To measure the customer satisfaction index (CSI), not all sub-criteria can be considered equally effective on customer satisfaction. It means that the fulfilling parameter, which leads to greater customer satisfaction, is more important. Therefore, during the customer satisfaction measurement, the parameters with greater impact on customer satisfaction should be of greater importance (Roushani and Zaribaf, 2008). Finally, according to the abovementioned points, a number will be calculated as the CSI using the following relationship (Roushani and Zaribaf, 2008):

$$CSI^1 = \sum_{i=1}^g a_i \sum_{j=1}^{n_i} B_{ij} \times \frac{\sum_{k=1}^K X_{ijk}}{K} \quad (1)$$

where  $g$  is the number of main categories (criteria) in which the customers' needs are classified,  $n_i$  is sub-criteria of each category and  $K$  is the number of the intended questionnaires to measure customer satisfaction.  $a_i$  is the weight of each criterion,  $B_{ij}$  is the weight of each sub-criterion and  $X_{ijk}$  is the score given by the customers for each sub-criterion in the questionnaire. In the above relation, the score of each sub-criterion received using the monthly survey questionnaires will be multiplied in its importance and sum of the calculated amount for each category will be also multiplied in the importance of that category (criterion) and summing the obtained amounts for each category, the criterion indicating customer satisfaction will be obtained.

The greater the amount of importance is, including the importance of each sub-criterion and the importance of each criterion, the changes in the satisfaction level of that sub-criterion will cause a tangible change in total customer satisfaction. In fact, the importance of each criterion will be obtained through multiplying  $a_i$  (the importance of criterion) by  $B_{ig}$  (the importance of sub-criterion  $Q_j$ ). Through this relationship, the customer satisfaction number is calculated per month, the mean is obtained for the 30 studied customers, and the result is the customer satisfaction number per month.

Consider that the maximum score for each sub-criterion is 9 and the sum of the importance numbers is equal to 1. Thus, the maximum customer satisfaction index can be 9. Comparing the number of customer satisfaction index at different periods, the management can observe the company's process of movement toward a customer focus and make rational decisions to improve their customer satisfaction index in the next rounds.

3. Monitoring, measurement and analyzing customer satisfaction changes during the period

The satisfaction of the 30 customers studied has been measured regularly and on a monthly basis and the number of customer satisfaction was calculated for each month.

The obtained number for each month is calculated based on the following formula. (Roushani and Zaribaf, 2008):

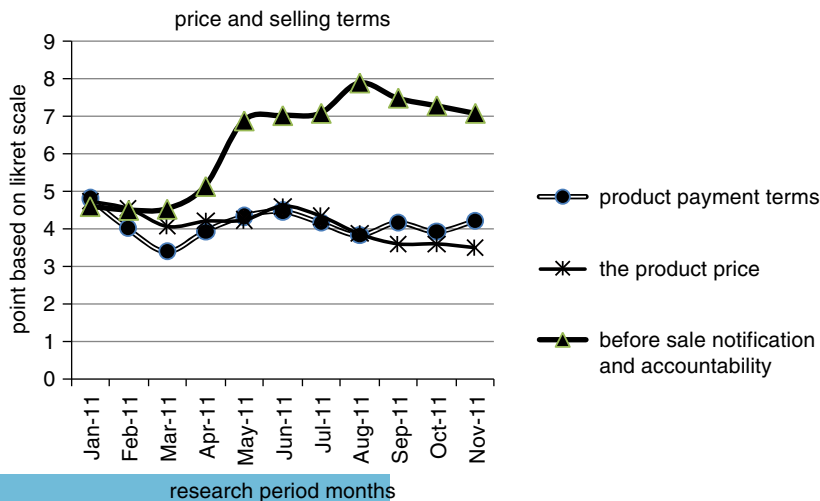
$$\sum_{k=1}^K \frac{X_{ijk}}{k} \tag{2}$$

**Results**

In this section, we review the trends of changes in the satisfaction level of kitchen worktops' customers toward each of the 19 criteria. According to the results obtained from surveys of 30 customers, the average score given by the customers is different in various months and, by showing these numbers based on a Likert spectrum in a chart, the process of change can be observed and interpreted. During the implementation of ISO 9001, all items that may be conditions of any effective sub-criterion will be registered. In this section, these charts and causes of any increase or decrease in the customer satisfaction level will be interpreted with the help of this information.

1. Changes in customer satisfaction toward the sub-criteria related to the product price and sales terms (Figure 2)

1.1 Product payment terms. In order to reduce the working capital for its investment in developmental projects such as the establishment of the second production line of kitchen worktops, and the production line of PVC-coated MDF sheets, the company studied made some changes from Fall 2010, and created resources to achieve its developmental goals by reducing payment time and the customers' settlement. It seems that these changes have highly affected the level of customer satisfaction toward the payment terms sub-criterion, so that we observe no positive course. Some previous studies on the effects of ISO show that there is a significant relationship between the



**Figure 2.** Changes in customer satisfaction toward the sub-criteria related to the product price and sales terms

implementation of quality management systems and organizational performance, while other researchers have concluded there is no such relationship or, if so, it is a weak one (Rusjan and Alice, 2010).

*1.2 Price of the product.* The cost price of the product consists of several components. On one hand, considering the approximately constant cost of wages and depreciation of fixed capital investment per unit of product, the main reason for rising prices is the increase of price of raw materials consumed. However, a large part of these price increases have related to the enhancement of quality of the raw materials consumed, the most important of which include:

- increase in the quality of MDF consumed (from 50 percent Iranian to 100 percent foreign), which is mainly provided from Thailand and China and has a much higher quality;
- the use of higher quality adhesives;
- the use of patterned finish-foil paper instead of regular white paper for back covers;
- replacement of previous packaging plastics with a high-quality type with a better physical appearance;
- hiring staff for quality control and customer care in the sales department;
- preparation of notification brochures and labels to control and track the product;
- staff training;
- providing measurement and control equipment;
- hiring staff for maintenance of machinery; and
- cost of providing new software and required items for documentation of the processes.

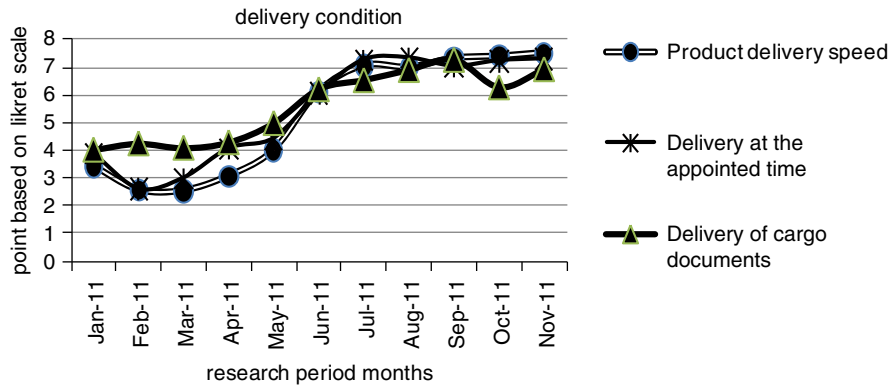
Thereby, it is observed that many of these costs that have not previously existed, and that have suddenly increased cost price and eventually the product price, could be a cause of the decline in customer satisfaction toward this sub-criterion. Quality management system activities have had a significant positive impact on the performance criteria of employee satisfaction, customer satisfaction and organizational effectiveness, but the effectiveness of these activities on the criterion of financial results and market was not confirmed (Najaf Abadi, 2007).

*1.3 Pre-sale notification and accountability.* Considering that a faster response to the customer demands, as a result of improvements in the processes associated with customers, is of the results of ISO 9001 (Karapetrivic *et al.*, 2010), some measures were taken which increased customer satisfaction after the ISO implementation. Training sales department staff, providing clear price lists and personal and telephone contact with customers, creating a web site, attending fairs to introduce products and make direct contact with customers, designing and sending the product samples and presenting full details about products and accountability to the customers were the measures determined and implemented in the form of an ISO 9001 quality management system by the ISO 9001 Steering Committee.

## 2. Changes of customer satisfaction toward the sub-criteria of delivery terms (Figure 3)

*2.1 Product delivery speed.* According to the previously conducted studies and the ISO Steering Committee, one of the main identified demands of customers is quick delivery





**Figure 3.**  
Changes of customer  
satisfaction toward  
the sub-criteria of  
delivery terms

of products. In this regard, the company's economic analysis was implemented in March 2011 based on the second production line of kitchen worktops and, through a doubling of the production capacity, the customers' waiting time was reduced on average from 20 to 10 days and the customer satisfaction score increased from 3/43 in January 2011 to 7/53 in November 2011, which indicates its effectiveness. Meanwhile, some changes were made in the production planning system to prioritize production orders and regular production, which have played a significant role. As Motwani and Kumar (1994) claimed, the implementation of an ISO 9001 quality management system will lead to a faster supply (shorter delivery time); thereby, there will be fewer customer complaints. In their research, Carlsson and Carlsson (1996) claimed that the implementation of ISO 9000 in Swedish industries improves the product quality, reduces waste, increases the product efficiency and decreases the product delivery time.

*2.2 Delivery at the appointed time (Figure 3).* Like the delivery speed graph, this graph is ascending, which represents the improvement of the customer's effort from the product delivery process. The measures taken in the production planning, arrangement of machinery maintenance program as well as the plans made to supply raw materials in a timely manner based on the executive methods of purchase and warehousing have had a positive effect on the uniformity of the production process and the prevention of deviation from its expectations.

*2.3 Delivery of cargo documents.* The documents, including the list of outgoing shipments to the customers, the data on the consumed raw materials along with instructions on maintenance and application, either had not existed or had been conducted irregularly and manually before ISO implementation. According to the decisions of the ISO steering committee, a warehouse software system and computerized and integrated order registration were used in the company.

### 3. The process of customer satisfaction changes toward the sub-criteria related to guarantee and after sales services (Figure 4)

*3.1 After sales technical assistance.* The chart and changes of the score of this sub-criterion from 4/7 at the beginning of the study to 6/3 at the end of the monitoring period of satisfaction indicates its ascending movement; measures such as a direct relationship between customers and the company's technical experts, applying the customers' intended changes in production, and responding to technical questions can be effective factors on customer satisfaction in this section. As Sharaj Sharifi (2011) concluded in previous research, after sale service in the automotive companies SAIPA and Iran

Khodro has increased customer satisfaction. ISO 9000 QS have been developed to meet customer needs through stable confidence and acceptable product quality (Sarkar, 1998).

3.2 *The company's tendency to meet customer needs.* This sub-criterion which indicates the customer's perception of the company in fulfilling its requirements reflect this feeling. The ISO 9001 quality management system increases reliability, durability and loyalty of customers (Karapetrivic *et al.*, 2010) and the implementation of the ISO 9001 quality management system is mainly aimed at meeting customer needs (Scott and Collins, 1998). The implementation of an ISO 9001 quality management system mainly aims to meet customer needs and the advantages for the companies who implemented ISO 9000 series QS were: better registration of important information, improvement in internal relations and improvement in the company's competitive strength (Dissanayak and Kumaraswamy, 2001).

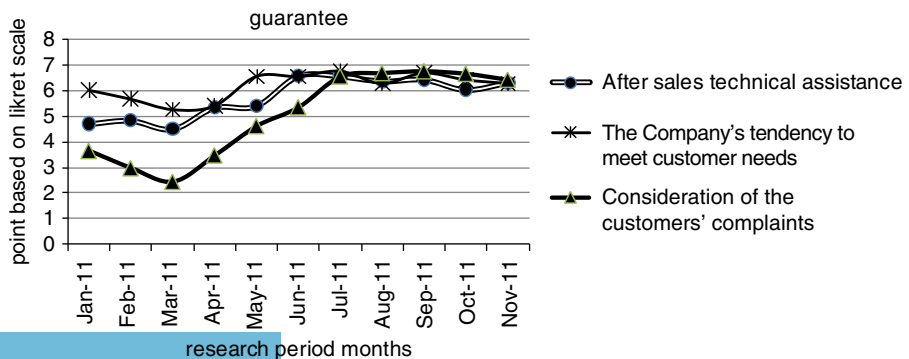
3.3 *Consideration of customer complaints.* Improvement of responsiveness to customer complaints has been proven to be the main positive change observed in the performance of companies with ISO 9001 (Mathews, 2005). Reviewing the graph trend, we conclude that the ISO 9001 quality management system has managed to have a very positive impact in this regard by increasing the satisfaction number from 3/63 in January 2011 to 6/4 in November 2011.

The main actions taken by the company to address customer complaints:

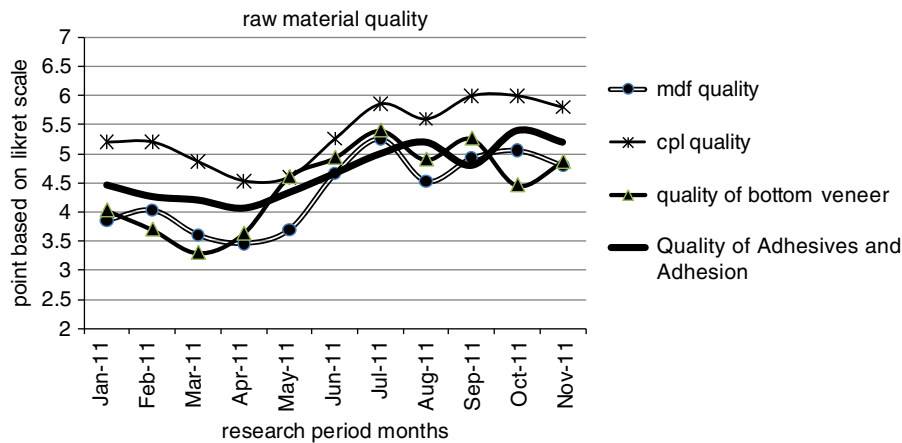
- establishment of a customer relationship system within the company;
- development of instruction regarding addressing customer complaints and immediate measures;
- prediction of measures to compensate potential damages to the customer; and
- attendance at the customer's location to review and respond to the customer's complaints.

#### 4. Changes in customer satisfaction regarding the quality of consumed raw materials (Figure 5)

4.1 *Quality of consumed MDF.* At the beginning of the investigation, and before that, the investigated company mainly fulfilled its requirement for this raw material from domestic factories. Regarding the decisions made about customer orientation and product quality improvement, in 2011, 100 percent of the MDF consumed was provided via imports of high-quality MDF. Observing the graph, we will see the increase of satisfaction level from the early months of 2011. However, difficulties relating to the



**Figure 4.** Changes toward the sub-criteria related to guarantee and after sales services



**Figure 5.**  
Changes in customer  
satisfaction regarding  
the quality of consumed  
raw materials

importation conditions during some periods of 2011, and the resultant inevitable use of domestic MDF, have caused some fluctuations in customer satisfaction level. The main advantages of imported MDF in comparison with the domestic versions are its uniform structure, not swinging at different storage conditions, and its greater resistance to moisture. Notifying customers via letter about the type of MDF consumed in production has had a large impact on this increase of satisfaction.

**4.2 The quality of worktops' top veneer (CPL).** In total, 100 percent of the coating consumed by the company is supplied from Turkey and, due to the high quality of this supplier's product, no action was taken to change it and the type of coating used at the beginning of the study has remained the same throughout.

**4.3 The quality of coating of the bottom surface of worktops.** The satisfaction level has increased from April 2011 to September 2011. Examining the company's measures to improve product quality to meet their customer needs, the main cause of this cross-sectional increase is the company's use of patterned finish foil paper instead of white paper to cover the bottom surface. However, the higher price of this raw material compared to the former type, and the resulting higher price of the product, stopped the company from using this paper.

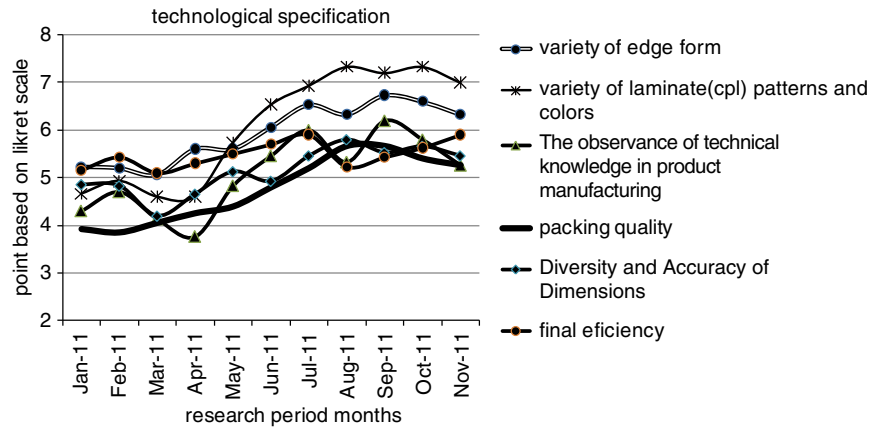
**4.4 Quality of adhesives and adhesion.** In order to increase the product quality and respond to customer needs, some measures were taken to improve the quality of the criteria affecting satisfaction, the most important of which include:

- changing the adhesive supplier and purchase from a reputable supplier;
- control of input raw materials and storage of adhesives at standard conditions;
- permanent control of adhesion and pressing processes by quality control personnel; and
- training coating pressing personnel.

**5. The changes in customer satisfaction toward sub-criteria of technical features of product (Figure 6)**

**5.1 Color diversity of coatings.** The ascending direction of the graph results from the measures which have tried to satisfy customer demands by examining them in line with standard implementation and concentration of their demands. One of the most important measures taken in this area is adding ten new colors of CPL coatings with a

**Figure 6.**  
The changes in customer satisfaction toward sub-criteria of technical features of product



sleek appearance, and controlling the inventory of coatings so that the colors requested by the customers should be always available in the company's raw materials stock.

*5.2 Diversity of form of the worktops' edge.* The graph trend of changes in satisfaction toward this sub-criterion shows the moderate increase of satisfaction level. It should be noted that, during the study period, the company had not taken any action to create diversity of edge forms and this slight increase in satisfaction level may be caused by customer satisfaction with other influential factors.

*5.3 The observance of technical knowledge in product manufacturing.* By examining the changes in customer satisfaction levels with compliance with technical knowledge in product manufacturing, it cannot be concluded that this graph shows the definitely positive impact of ISO 9001 management system implementation.

It seems that the company's measures to make the product's quality close to the similar foreign quality, such as creating a groove in the dropper for kitchen worktops, and using MDF of high thickness for one-off production of kitchen worktops, have increased satisfaction.

*5.4 Packaging quality.* Increased satisfaction in this regard has resulted from the decisions made by the company in order to give value to the products through improving packaging quality. The use of high-quality and patterned nylons and bubble bags increased the protection level, reduced vulnerability and improved the customer friendliness of the product. Changes in satisfaction levels show the success of these actions; which is caused by consideration of the customers' demands.

*5.5 Diversity and accuracy of dimensions.* After considering the customers' demands, the company concluded that one of their demands is to produce worktops with custom dimensions and accuracy of dimensions of produced worktops; it took some measures to meet these demands as follows:

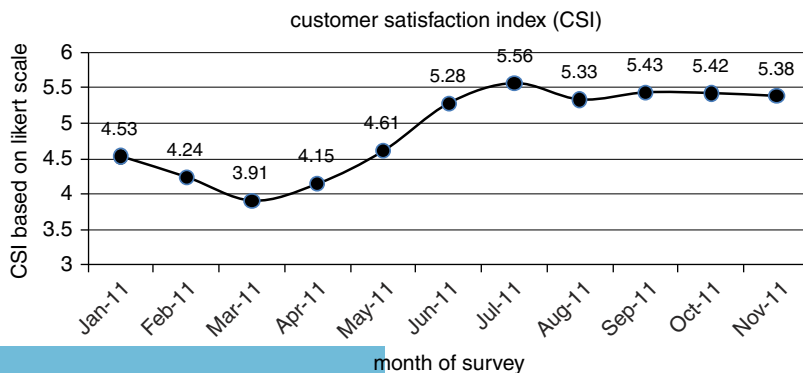
- purchase of tenoner device which performs measurement and instrumentation with high accuracy;
- In all, 100 percent control of worktops dimensions by quality control personnel after the instrumentation process;
- purchase and installation of high-width flat press that made it possible to produce worktops with width above 90 cm; and
- acceptance of orders from customers who have requested kitchen worktops with their own desired dimensions.

5.6 *The final efficiency of the product to the end user.* This criterion indicates the final customers' conception and their satisfaction level. Changes in these graphs do not show a significant increase, but based on the Likert spectrum used, it is as a good option that represents the desired satisfaction level with the product. Perhaps another reason of uniformity of changes in the end user's satisfaction with the product efficiency is that the product's final performance is not measurable during the 11-month period of monitoring and measurement, and more time is needed to specify the product's performance and durability.

### Measurement of CSI

The main purpose of monitoring and measurement of customer satisfaction during the research period is to measure the customer satisfaction index and the process of changes in this index are shown in Figure 7.

According to this graph, it can be concluded first how much the customer satisfaction level has been per month and a criterion is obtained to determine how well customers are satisfied with the desired product. Second, through investigation and interpretation, a relationship can be found between customer satisfaction level and the establishment of an ISO 9001 quality management system, and the company's movement can be determined toward customer orientation. It should be noted that since this satisfaction level is the maximum of 9, in order to achieve this number by using the principles of the ISO 9001 quality management system, the company analyzed extensively how to achieve the goal every month and specified the actions which should be taken to achieve the desirable level of customer satisfaction index. The positive trend of this graph reflects the increase in customer satisfaction level with the company. Reviewing 19 factors affecting the overall customer satisfaction index showed that the negative slope of this index in the early months of the ISO implementation can be affected by customer dissatisfaction with the following items in these months, the high weighting of which has decreased the customers' total index: payment terms of product, price, product delivery speed, delivery at the appointed time, addressing of customer complaints, quality of MDF and quality of the underlying surface. However, the enforcement of the targeted subsidies law, and the rising prices of energy carriers and transportation costs from the early winter of 2011, have had a large impact on cost price. The problems occurred due to the increase in price of a load of vehicle fuel which caused disturbances in the process of product delivery. Considering that many of the measures taken in the form of implementation of the ISO 9001 project were implemented from early 2011, the result of all these measures in



**Figure 7.**  
Changes in customer  
satisfaction index (CSI)

various parts of the increase of product quality and enhancement of the employees' performance can be observed from this period of time. So that the customer satisfaction index will reach 5/56 in July 2011, which indicates the positive effects of ISO implementation on customer satisfaction index, and this claim will be done according to the statement of (Sarkar, 1998), suggesting that the effectiveness of the system can be judged by high satisfaction of customers. In addition, the increase of production through the establishment of the second production line in order to meet the needs of customers has also increased the market share. Market share has been the first advantage of this system in the list of strategic advantages for a business (Rusjan and Alice, 2010).

From July 2011, the customer satisfaction level remained constant, that is affected by the following factors:

The measures taken in the form of implementation of ISO 9001 quality management system had increased the cost price of the product, so that the dissatisfaction with the product price can be observed in the graph. Given the high weight of price criterion, presenting this trend might have led to reversed results in customer satisfaction level.

The increase in the customer satisfaction index caused by the ISO 9001 quality management system implementation in this research is also consistent with findings of Rusjan and Alice (2010) who claimed that ISO implementation will stabilize the quality expected for product and service, reduce customer complaints and non-conforming products and increase customer satisfaction along with other effects of its implementation.

Quality management systems can help an organization to increase satisfaction of their customers and employers. Quality management systems encourage the organization to analyze customer needs, determine the processes affecting the achievement of a product considered acceptable by the customers and control these processes. A quality management system can provide a framework for continuous improvement to increase the probability of enhancing the customer satisfaction level and that of other interested parties. This system gives confidence to the organization and its customers that the organization is able to provide a product that continuously meets their needs (Massoudi Far, 2008). Today, manufacturing or service organizations consider customer satisfaction as an important criterion to assess the quality of their work, and this trend is still rising. Customer care and satisfaction are factors that refer to worldwide competition. Customer satisfaction is one of the main aspects of quality management systems and organizational excellence models (Melki and Darabi, 2008).

### Conclusion

According to the results of the weighting, the factors influencing satisfaction of kitchen worktops' customers, price and sales terms of this product have a significant impact on customer satisfaction and, in competitive conditions, this criterion has a determining role in the creation of utility for customers. ISO 9001 Quality Management System has been able to increase the customer satisfaction index within the 11-month period of study. Some of the actions taken by the company studied to improve product quality – which took a fairly large investment – were to use high-quality imported raw materials and to apply continuous quality control through the establishment of a quality control department, and hire new educated staff, which have had a negative effect on customer satisfaction with the product price. However, the increased cost of importing raw materials and the problems arisen from political conditions have not been affective. Also, low-risk short-term economic benefits regarding new investments for increased production and the achievement of new markets could affect the decisions

of senior management and, despite the customers' dissatisfaction with the payment terms, provide the necessary financial resources through hardening payment terms. Understanding the ISO 9001 quality management system and customer demands by the senior manager, and his strategic decision to meet customer demands, greatly assisted the effectiveness of this system on customer satisfaction. Investment to purchase new equipment and pay additional fees for higher quality raw materials and new personnel confirms the fact that, before attempting to run the system, the senior manager took the necessary actions through understanding customer needs. This indicates that the application of a quality management system alone does not have the necessary efficiency, and supporting actions to meet customer needs by the organization's senior manager has an important role.

### *1. Implementing problems of ISO 9001 quality management system*

ISO 9001 itself has been designed to facilitate the issues and create economic advantages for the organization, but due to inaccurate implementation or incorrect understanding of ISO 9001 concepts, may cause problems, some of which are observed during the implementation in the studied company, and are as follows:

### *2. Bureaucracy*

During the implementation of the quality management system, a high volume of documents were created for documentation of the process which causes problems with the collection, completion, filing and subsequent references to these documents; especially because the lack of familiarity of personnel and workers with these documents causes disturbances in the normal working environment.

### *3. ISO 9001 implementation costs*

The process cycle is normally completed in accordance with principles and standards, and needs some costs for issues such as attracting of new educated staff, the purchase of measurement equipment, training and so on. Convincing the company's senior managers to provide for these costs has led to the expenditure of much time and energy.

### *4. Regulation of the company's managers and staff*

Normally, during the process of implementation of an ISO 9001 quality management system, the greatest change must be endured by the company's managers, because the company's managers must have admitted that they must follow the regulations and guidelines of the system, like most ordinary employees.

### *5. Personnel's custom to non-codified method*

Since work has become scientific, and management has become more scientific, a system was defined and documented according to which things are performed. However, some executives raised this issue, i.e. documentation, as a fault and consider them to cause the stifling of innovation.

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